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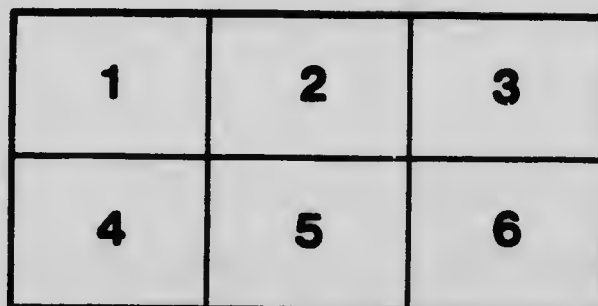
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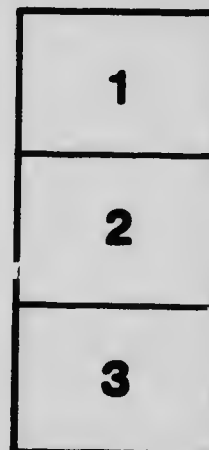
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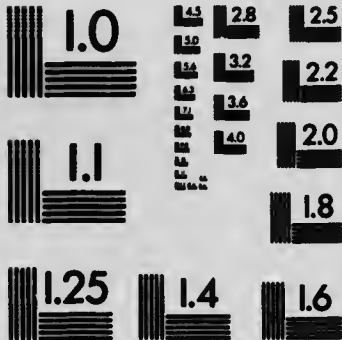
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GEOLOGICAL SURVEY OF CANADA

ROBERT BELL, D.Sc., (Cantab.), M.D., LL.D., F.R.S., I.S.O., ACTING DIRECTOR.

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1904

REPORT

ON THE

PEACE RIVER REGION

BY

JAMES M. MACOUN



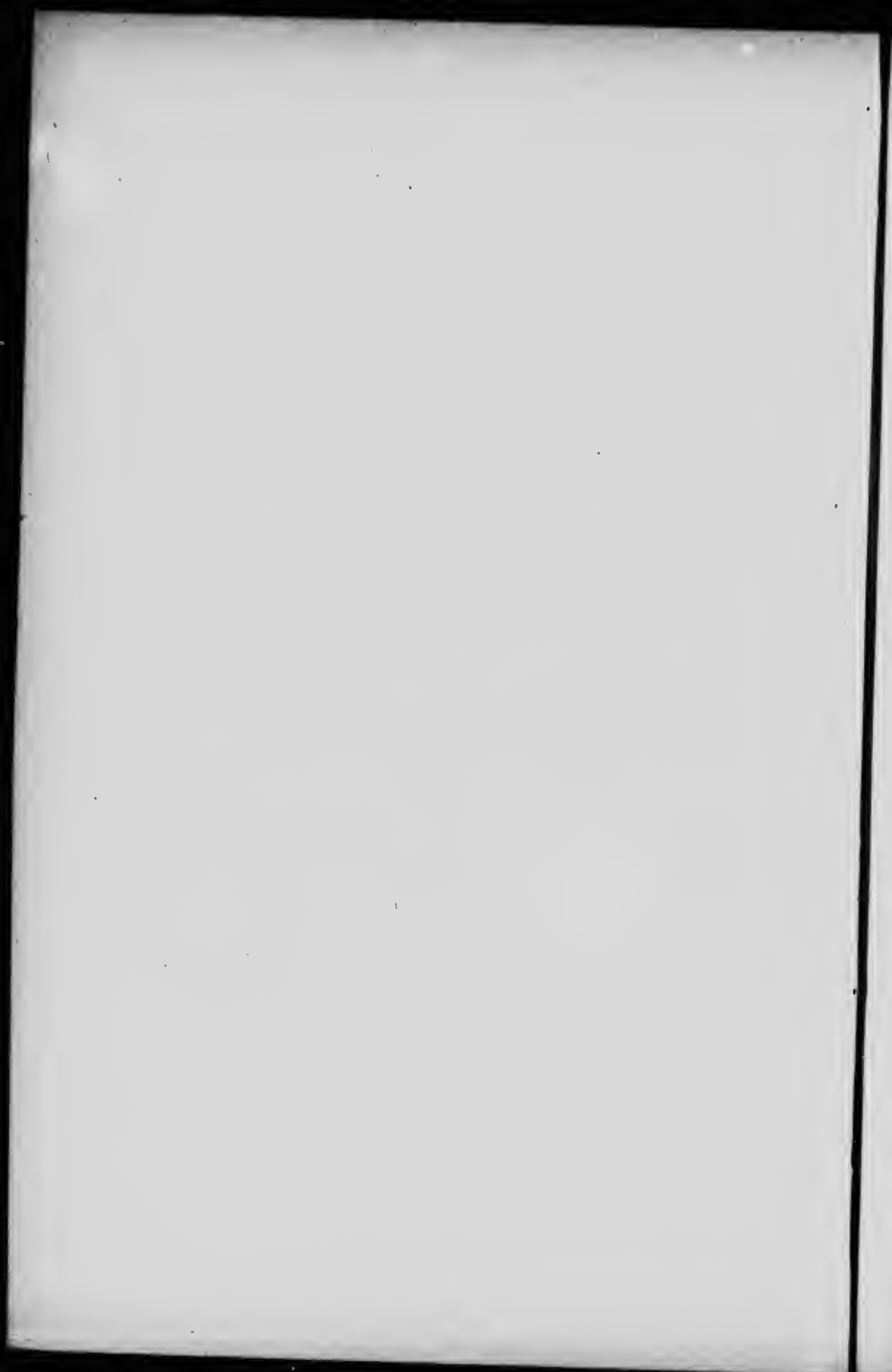
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Dr. ROBERT BELL, F.R.S.,
Acting Director, Geological Survey,
Ottawa.

SIR,—Pursuant to your instructions I left Ottawa on the 4th of May and travelling by the usual routes reached Edmonton on the 11th. I was joined there by Mr. William Spreadborough who acted as my assistant during the summer and together we drove to Athabasca Landing where we remained until May 23rd, when we were enabled to take passage on a Hudson's Bay Company's York boat bound for Lesser Slave lake. After a short delay on the lake, caused by the ice not yet having broken up, we reached the trading post at the head of the lake on June 2nd. Horses and wagons having been hired there, we drove to Peace River Landing where I expected to be able to buy horses, but finding none for sale I was very glad to hire a pack-train for the summer at a reasonable rate. In the report which follows, the route travelled until I arrived again at Lesser Slave lake in September is described in detail. From Lesser Slave lake to Ottawa I travelled by the same route as that by which I entered the country. A large collection of natural history specimens was made during the summer. These include most of the plants and insects seen, as well as a very fine representation of the birds and small mammals collected by Mr. Spreadborough.

I have the honour to be, Sir,
Your obedient servant,

JAMES M. MACOUN.

OTTAWA, 15th December, 1903.



REPORT

ON

THE PEACE RIVER REGION

Practically all the glowing reports on the Peace river region have been based on crops grown in the Peace river valley between Peace River Landing and a point about fifteen miles up stream on the north side of the river. "The Settlement," as it is called, has grown up around the Church of England and Roman Catholic missions and very little unoccupied land remains. The valley of the Peace river, though from two to three miles wide, from the level country above the river on one side to the edge of the plateau on the other, contains very little land suitable for agriculture, none at all worth discussing in this report, except in the part under consideration. Between the water and the upper "bench," the mile or so of country is steep and broken by ravines and coulées and except for grazing purposes is of little value. Opposite the mouth of Smoky river, however, there is a fertile flat of several thousand acres and here agriculture has been carried on successfully for many years. Wheat and other cereals ripen every year and vegetables of all kinds attain perfection. There are occasionally light summer frosts, but these do little damage and, except for a rare season when drought prevents growth, magnificent crops are harvested. The grain is usually all cut before the end of August and early autumn frosts do no damage except to such plants as Indian corn, tomatoes and beans. At Dunvegan, further up the river, there is a much smaller flat where the conditions are about the same. In the valley proper very little land remains that has not been settled upon by either white men or half-breeds.

The Peace
River valley.

As will be explained in detail in another part of the present report this is the only part of the upper Peace River country in which any continued systematic attempts at agriculture have been made and nearly all the reports on the climate of the Peace river country and the fertility of the soil have been based on observations made in the

valley. Good crops have been raised in other places and it may be said here that the soil is good almost everywhere throughout the Peace river region, but to attribute to the whole country the climate of the valley creates a false impression and one which has already brought not a little hardship and suffering upon those who have settled in less favoured localities. The prairie country north of the Peace river, and the Grande and Spirit river prairies to the south are between 700 and 1,000 feet higher than the valley bottom and in these latitudes 700 feet of altitude effects a considerable change in climatic conditions.

At "The Settlement" above Peace River Landing there are two small grist-mills at which most of the flour used in the vicinity is ground, and two saw-mills cut all the shingles and lumber required for building purposes.

Crops grown
in valley.

So much has been written about the "wonderful" crops grown in the Peace River valley that they require no description here. The grain grown is certainly of excellent quality; it cannot be excelled, but the yield even in the best seasons is in no respect extraordinary. Potatoes, and indeed all the hardier vegetables, do exceedingly well, while tomatoes ripen and Indian corn matures sufficiently to be eaten in most years. The report that melons ripen is not without foundation, but not more than a dozen vines are ever cultivated and a single melon in rare years is considered worthy of note. In 1903 a light frost on June 30th touched beans and potatoes so that even this favoured locality does not entirely escape frost. The fact that "The Settlement" is in the bottom of a narrow valley should never be lost sight of, and there is no warrant for applying the results of agriculture in the valley to any part of the plateau country. When frosts are general throughout the country, the farms in the valley often escape, protecting fogs rising from the river as the temperature falls.

COUNTRY NORTH OF PEACE RIVER.

Character of
soil.

After leaving "The Settlement" the trail to Dunvegan was followed for about 15 miles to Old Wives lake. On the higher slopes of the valley the soil is somewhat better than nearer the bottom, and though light it is not gravelly. After reaching the plateau the soil changes to a heavy, black clay-loam, and it is of this character until Old Wives lake is reached, a little lighter in some places than others, but everywhere rich and productive. Where this soil was heaviest it was so hard that tent pins and tether pickets could be driven into it only with the greatest difficulty. The vegetation was everywhere luxuri-

ant, leguminous plants predominating. Among these *Vicia Americana* (Vetch), *Lathyrus ochroleucus* (Wild Pea) and *Hedysarum lyrata* are the most important. The first of these is what is commonly known as "pea vine" throughout the Peace River region. From Peace River Landing to Old Wives lake the plateau may be characterized as prairie, but it is broken by poplar and willow coppice and in some places by patches of forest land, but there are hardly more large trees than will be required for house-logs and fence-rails when the country is settled. To the north of the trail the timber is heavier. Hay could be made almost anywhere in ordinary seasons on the open prairie, but this year the dry weather prevented growth. Old Wives lake is about one mile long and a third of a mile wide, surrounded by a marsh where a great quantity of good hay can be made in the autumn. About two miles south of the lake there is a large spring known as Cold spring. It gushes from a small depression and forms a shallow brook seven feet wide a few yards from its source. The water is very cold, but there is no trace of mineral either in the water or on the stones and pebbles. The country between Old Wives lake and the river and westward to Burnt river was examined later in the season, and was found to be of the same general character. A small area near Burnt river is thickly strewn with boulders. The whole of this region is underlain by the silt described elsewhere.

From Old Wives lake we turned north on July 9th to Bear lake. Tralls over which wagons can be taken run directly from "The Settlement" to both ends of Bear lake. This sheet of water is larger than shown on the map, being at least eight miles in length and three or four in width in places. It is bordered by a fringe of wood on the south-east and south-west sides and towards the north by a solid forest. Near the north-east end of the lake the soil becomes somewhat lighter, but is a rich sandy loam. From this point there is a well-travelled Indian trail running north to the White-mud river, and this trail was followed. For more than a mile it runs along the shore of a muddy bay, and then a little east of north for about three miles, when Bear creek, the discharge of the lake, is crossed. For the greater part of this distance the country was covered with *brulé* (spruce and poplar) and small spots of muskeg. The creek is crossed by a good bridge. Travelling about three miles further in the same direction, the creek is again touched, where it turns more to the east. It is from ten to fifteen feet wide and three deep, with a sluggish current. For the next six miles to our camp (July 10-11) the country was slightly rolling, with aspen and willow on the higher land and spruce and some tamarack and balsam-poplar on the low ground. There were a few

patches of prairie along the trail, none more than a few acres in extent, and several small swamps and marshes were seen. The vegetation proved the climate to be colder than south of Bear lake.

White-mud
prairie.

The maps show the White-mud prairie to begin a little more than ten miles north of Bear lake, where we were camped, but in travelling about six miles further, to the crossing of the White-mud river, no true prairie was seen, except a few patches of from ten to twenty acres around the regular Indian camping places. There were, however, several stretches of open country which might be called meadow land. The only one of these of considerable extent was about one mile long and about one-fourth of a mile wide. The trail, running now a little west of north, followed these open patches until the White-mud river was reached. The country on both sides of the trail was covered for the most part with spruce swamps, spruce and aspen mixed where the ground was higher, and aspen alone on the highest ground. No characteristic prairie plants were noted on the open ground, and the vegetation everywhere denoted a cold unproductive soil. The ponds and marshes were bordered by alkali flats. There was no tract of open ground large enough and with sufficiently good soil for a single homestead, though much of the country would be suitable for cattle raising, as an abundance of good hay could be made, and, in addition to the marshes and open spaces, a considerable portion of this region is covered by willows, among which there is good feed. After crossing the White-mud river, it was followed for about two miles and a half, and then, turning north for about a mile, camp was made on a small creek which runs eastward towards the White-mud. From this point the country was examined to the east and north, and from a later camp, where the White-mud crosses the Dunvegan and Battle river trail, excursions were made to the north and west. It was found that except near the streams or trails there was no open country, and that good prairie land was confined to a few ridges where the drainage was good. The trail referred to above, which shows the route from Bear lake to the White-mud river is through an oversight not shown on the map which accompanies this report.

Character of
soil.

The flats near the streams are covered with vegetation, the character of which shows the soil to be wet and cold, and this has as much, or perhaps more than the climate to do with the difference in the dates of the flowering of plants, which were at least two weeks later in coming into bloom than the same species near the Peace river. The flats referred to above were never more than a mile or so wide and the presence of alkali could generally be noticed on the borders of all depres-

sions where water accumulated. The forest in every direction was composed principally of small spruce mixed with tamarack, indicating the wet character of the soil. If the climate were suitable, a few thousand acres might be cultivated in this region, but it is very doubtful whether grain would ripen except in extremely dry seasons. West of the 6th principal meridian, the country is somewhat more rolling and consequently drier, so that aspen poplar replaces the spruce to some extent.

Turning south on the trail to Dunvegan, the country passed through for the first five miles is very similar to that described above, the only open patches being along the trail. Further on, the trail climbs a long ridge 200 or 300 feet above the valley, and this ridge is followed for several miles. A good deal of small birch and a few balsams are mixed with the other trees on this ridge and on the summit there are a few Jack pines. The undergrowth on this "portage" is principally high-bush cranberry (*Viburnum*) and alder, showing that there is much moisture. About a mile north of the 22nd base line, where the trail crosses a large bend of MacAllister creek, there is a large hay meadow, the only large one seen north of Island lake. It contains about 1,000 acres of fine hay and pasture land. The soil on the high ground around it is very sandy and it is doubtful whether either grain or vegetables would do well there. From this place to Island lake there are patches of prairie along the trail but these aggregate only a few hundred acres. As far as the eye could reach in every direction the country is covered by forest.

Country south
of the White-
mud.

Island lake is shallow and surrounded by forest and marsh. A great quantity of hay can always be made here and it is an ideal place for wintering cattle. Between Island lake and Hay lake the trail passes through woods and across swamps and marsh for about three miles, when it emerges on a beautiful piece of country, much the finest seen on the north side of the Peace river and unexcelled anywhere in the region examined in 1903. The soil is a rich black loam, deeper than that further east and not nearly so heavy; the country is slightly rolling and the drainage good. This area may be roughly delimited as being bounded on the west by the meridian $118^{\circ} 30'$, on the east by Burnt river, on the north by the forest and on the south by Peace river,

The area of prairie or "bluffy" country between Peace River Landing and Dunvegan may be roughly estimated at 400,000 acres. The soil varies somewhat in character, but it is everywhere fertile and well suited to the growth of cereals, the only drawback being the scarcity

of water in dry seasons. The climate is such, however, that I have been forced to the conclusion that wheat at least can never be considered a certain crop and that in many years neither oats nor barley will mature. This conclusion is based on the character of the vegetation, on the records of severe frosts and the experiments which have already been made in growing cereals on the plateau.

Former reports.

The region under consideration was first reported upon by Dr. G. M. Dawson in 1879. He says: "The soil is everywhere exceedingly fertile and the general aspect of the country exceedingly beautiful."*

The country north from Dunvegan to Battle river was described by Mr. R. G. McConnell in the same year. This report may be summarized in Mr. McConnell's words as follows:†

"For several miles after reaching the plateau (north of Dunvegan) the country passed through was somewhat rolling and dotted with aspen coppices, but gradually the rolls ceased and at a distance of about six miles from the river became almost perfectly level. * * * * The soil displayed where the trail has been worn somewhat deeply was a heavy clay covered with rich black mould often over a foot in depth * * * * This style of country continued for a distance of about fifteen miles from the river and then commenced gradually to change for the worse."

Mr. McConnell's description of the country between Hay lake and White-mud river is similar to my own. Of the region about White-mud river he says: "It flows in an easterly direction and the country we descended into appeared to be its valley. If so it is from north to south, where the trail crosses it, about fifteen miles in width but appears to narrow westward, another range of hills running from the south-east seeming almost to close it up. Between these two ranges of hills and stretching eastward and south-east ward as far as the eye could reach is a large area of magnificent country, slightly rolling and dotted here and there with clumps of aspen and willow. This reach of country according to half-breed report follows White-mud river to its mouth and bears the same character throughout. This would make it about fifty miles in length with probably an average width of twenty miles."

As already stated, the country along the Battle river trail is open, and near the crossing of the White-mud river there are patches of prairie land but the open country to the east described on page eight is

*Report of Progress, Geol. Surv. Can., 1879-80, p. 58 B.

†Report of Progress, Geol. Surv. Can., 1879-80, pp. 58-60 B.

of a very different character. There is very little real prairie north of the White-mud. It may be added that the forest is encroaching upon the open areas and much of what Mr. McConnell reported to be poplar coppice is now forest.

Mr. W. T. Thompson, D. T. S., who surveyed the 6th initial meridian and the 22nd base line in 1882 says :*

'The country in the vicinity of the trail from Peace River Landing to Dunvegan, a distance of 65 miles, is mostly prairie, dotted with bluffs of poplar and willow ; the soil is very fertile and appears to be well adapted for agricultural purposes. Between Little Burnt river and Dunvegan, a distance of about 20 miles, the country is very fine ; extensive prairie openings are separated by bluffs of large sized poplar, the approximate area of prairie and bluff being 300,000 acres.'

The only places at which any attempt at agriculture has been made on the plateau are Old Wives lake, the east end of Bear lake and at "the waterhole" about 9 miles from Dunvegan. At Bear lake a small patch of potatoes had been planted in 1903. When I arrived there, July 9th, the field was examined and it was found that the vines had been frozen twice within the previous week or ten days. They were again frozen during the night of July 9-10 when there was five degrees of frost. Between 1882 and 1887, farming on a small scale was attempted at "the waterhole," at first by settlers, afterwards by the Hudson's Bay Co. I was told at Dunvegan that a crop was harvested only once, but no one who was there in 1903 could tell me of what it consisted. No attempt at farming has been made there since 1887. Attempts at agriculture.

The Rev. J. G. Brick, for many years an Anglican missionary at Dunvegan and the Smoky River Mission, cultivated several acres at Old Wives lake between 1884 and 1889. His son Mr. A. Brick who has now the largest farm at "The Settlement" told me that in the six years he had harvested but three crops. One of these amounted to very little, the other two were good. Mr. Brick did not remember what kinds of grain were grown.

Mr. Wm. Ogilvie spent several seasons surveying in the vicinity of the Peace river and in 1891 prepared a special report on the resources of that region. Of the part under discussion he says :† Mr. Ogilvie's report.

'In the summer of 1883, while I was engaged surveying on the plateau in the vicinity of Dunvegan, we had frost three or four times in August severe enough to destroy any grain at the stage of develop-

*Report of the Department of the Interior 1889, p. 68.

†Report of the Department of the Interior 1892, Pt. VII.

ment it would be in at that date, and, worse still, there were severe frosts in July. It appears from this data that though farming in the immediate valley of the river has always met with a large share of success, on the plateau the experience is far from satisfactory, that is what little there is of it, and, as both places tried were selected for their favourable location, it is reasonable to assume that it is a fair test of the capacity of the plateau. The difference in altitude between the river-bottom and the plateau being about 1,000 feet generally, this alone would account for the different results of a frost. In addition to this, the presence of a large body of water in the valley at a temperature of 55° must have a beneficial effect, also the condensation of moisture in the valley emits heat during the evening, so that a frost cannot have the same effect there as on the plateau.

Plateau not
suitable for
settlement.

'To conclude on this subject, I would not advise anyone seeking a home in our great North-West to think of Peace river. There is but a limited area in the valley, which is the only place success can be reasonably expected, and even there success is merely an assurance of a living, as there is no market at present. * * * I regret that I have to present such an unfavourable account of a region of which much has been said and written. That the soil is excellent and much of it available for immediate use cannot be denied, but the occurrence of severe frosts on the plateau when the grain is not far enough advanced to resist its effects may be, as far as our experience goes, considered a certainty in the majority of seasons. It may be that, when the necessities of settlement require it, early seeding and early varieties of grain may materially alter conditions, but at present I would advise no one to think of farming there except in the river bottom, in which there are flats extensive enough to locate a few score homes.'

In 1893 Mr. H. Somers Somerset travelled through the Peace river country and in 1895 published "The Land of the Muskeg," from which his estimate of the country quoted below has been extracted. Were Mr. Somerset's opinion based on his own observations alone it might not be of any great value, but he spent several days at "The Settlement" with the Rev. J. G. Brick, referred to above, and Mr. H. B. Round, who was in charge of the H. B. Co.'s post at Dunvegan for fourteen years, was with him during the whole season, and it was upon information given by these gentlemen that his estimate of the country was chiefly based. He says:

'The notes to be found on the maps of the country are emphatic in their praise of the soil, which is undoubtedly fine, but, if the experience of the inhabitants is to be relied upon, the whole area fit for cul-

tivation only comprises a few small riverside flats in many thousands of square miles. There has lately been a great "boom" about the Peace river. Mr. Pike has already done his best to prick the bubble, but I have heard so many ignorant people aver that this is a great farming country that I think the facts cannot be too often repeated. It is a dreadful thing to think of the wretched emigrants who toil to this promised land only to find a useless country, and who are often unable to return to civilization, but are enforced to endure all the severities of the winter in a latitude where the thermometer has often fallen to 60° below zero.'

I was told by those who had been longest in the country and knew it best that there was no month during the year when frosts might not be expected on the plateau and such frosts occurred in every year for which we have reports. Mr. Ogilvie's statement has been already quoted, Mr. Thompson says in regard to 1882.*

'The spring and summer were cool and cloudy, with light showers of rain and occasional frosts (the latter, I was informed, were quite unusual).'

Of 1879, Mr. McConnell says in explanation of the leaves having turned yellow near the Battle river :†

'This appears to have been due to the cold of the night of the 20th August, when the thermometer registered 12° of frost. This frost, according to the experience of the Hudson's Bay Company's people, was quite exceptional in its severity at so early a season, but besides it, two other light frosts were experienced on the trip,' (between Dunvegan and Battle river).

A reference to the table of temperatures in another part of this report will show that in 1903 the thermometer fell below 32° on only two occasions in July, but the available information affords abundant warrant for Mr. Ogilvie's belief that the occurrence of severe frosts may be considered a certainty in most seasons.

COUNTRY SOUTH OF PEACE RIVER.

The Peace river was crossed at Dunvegan on the first of August and the whole of this month and the early days of September were spent on the south side of the stream. There is great need of a ferry at this point, as the only means of crossing the river is a skiff, the

* Report of the Department of the Interior 1889-90, Pt. II p. 71.

† Report of Progress, Geol. Surv. Can., 1879 p. 61B.

property of the Hudson's Bay Co., and though the officers of the company, at great inconvenience to themselves, act as ferrymen, this privilege might be withdrawn at any time, or the boat drift down stream. There is no other boat within fifty miles of this point. Horses must always swim the river and the landing on the south side is dangerous when the water is high.

Spirit river.

There is a wagon road from Dunvegan to Spirit river a distance of fifteen miles. The ascent from the river-valley is gradual, the distance to the plateau by the trail being about seven miles. From the edge of the plateau to Spirit river (Ghost river on the maps) the trail runs through an almost level country. Two days were spent at Spirit river at this time and four days near the end of August. The river was first reached from the north; our route from there was towards the west; we returned to it from the south and finally left it going towards the east. Every farm and piece of breaking was visited and I was fortunate enough to meet and talk with nearly every settler. The area of the Spirit river prairie is difficult to determine, as it is much broken by bluffs of poplar and willow and thickets of service-berry and other bushes, but at the outside estimate there are not more than 60,000 acres fit for immediate settlement and the quantity is probably less than that amount. Spirit "river" is a small creek two or three yards in width and without water in the autumn of very dry seasons. The soil varies in depth and quality, but the best land is within a mile or so of the creek and north in the direction of Peace river; towards the south and west the soil is shallower and the drainage not so good. About twenty homesteads have been located, all but two or three on the creek, though no surveys have yet been made. Mr. Charles Bremner has been settled there for many years, but he has confined his farming operations principally to raising cattle, oats and vegetables, as there is no grist-mill within reach and such wheat as has been planted has only been by way of experiment. Part of his wheat was frozen in 1902 and I was told that in 1901 his small crop was harvested. In 1903 barley and wheat had headed on August 2nd. When I left Spirit river, August 27th, Mr. Bremner's grain was riper than any other in the vicinity, barley 6-rowed, 2-rowed and hull-less was fit to cut and the wheat turning yellow; oats were nearly ripe on one or two farms, but with these exceptions no other grain seemed as if it would reach maturity. A rather dry June delayed growth at that time and a cold cloudy August with frequent rain prevented the ripening of grain. With the exception of Bremner's field and two or three others near it, all the grain planted in 1903 was on new "breaking". Altogether there were perhaps 200 acres under culti-

Condition of
the crops.

vation in that region. Vegetables, such as potatoes, turnips, beets and carrots were a good crop. Potatoes at the end of August were full-grown but very wet; the stalks were still green. Garden peas had ripened, but beans, cabbage and cauliflower amounted to nothing as they were planted late. The condition of the crops at Spirit river in 1903 could hardly be taken as a fair test of the capabilities of the region, for as there is no market, most of the planting was only done for seed and fodder, so that there was very little careful farming. The soil in the vicinity of the Spirit River prairie is in general lighter and deeper than on the north side of Peace river, but the elevation is about the same, and I could discover no reason why the climate should be better here than on the plateau a few miles to the north. That it is better is the universal belief of those who have lived in the country and this belief must be accepted until it has been proved to be unfounded. It was hoped that reports on this year's crop that were to be sent to me by settlers would have been received in time for inclusion here but only one of these has reached me.* My correspondent is absolutely trustworthy but prefers that his name should not be used. He says:

"We are in a bad way here. Little hay and less grain. Hard frost on the 4th of September. We were encamped at Saddle mountain on our way to Grande prairie. There was about an inch of ice in our teakettle. Rained on the 5th, snowed on the 6th and 7th. Rained every day until the 12th, then it snowed again. It was a terrible week. On the 14th (at Spirit river) we had 12° of frost. All was over with the grain. The crop at Burnt river still stands, or lies flat. The continued rain and the dillydallying of the halfbreeds has lost my crop for me. It was ripe before the spell of bad weather came on."

The crop referred to here consisted of about 20 acres of wheat, oats and barley on new "breaking" on Burnt river, about seven miles S.E. of the main settlement at Spirit river, and though not so far advanced when I saw it as others nearer Spirit river, was in other respects the best looking crop in the region. That this crop was fit to cut before September 4th is satisfactory evidence that the more advanced crops were harvested before that time.

Most of the settlers at Spirit river have a few head of cattle and horses—Mr. Bremner more than a hundred, I was told. Sufficient hay must be cut to feed these cattle for more than four months. Every one at Spirit river in 1903 agreed that this was absolutely necessary. In rare seasons the cattle may be able to run longer than usual in the autumn, but hay for the full season must always be cut. It is

* See later letter on page 48.

currently reported at Edmonton that 80 or 90 days is the period for which feeding is necessary, and I was told in Edmonton by a man who had wintered at Spirit river that his cattle had been fed for only 80 days. However this may be, the fact remains that the usual period is between four and five months. The Chinook winds, so often spoken of as prevailing here and at Grande prairie, do no doubt sometimes occur, but their influence is very slight, and they usually do more harm than good. They are seldom strong enough to take off all the snow, and the wet grass when frozen is not relished by the horses, which run out most of the winter. When cattle are allowed out after a Chinook they always get in poor condition, and the general belief is that they require more hay to restore them to their former condition than if they had not been allowed to run at all.

Hay making. When I was at Spirit river towards the end of August every one was engaged in hay-making. Some of the settlers were cutting upland hay while others were cutting "pea-vine" which grows very luxuriantly in open spots between thickets. There are few hay marshes within reach. In most years upland hay may be obtained anywhere, but this sort of grass cannot be cut to advantage more than two years in succession on the same ground. On the prairie itself and in the open woods in its vicinity, there is ample hay for the needs of settlers, but if it were made a ranching country large herds of cattle running free would destroy much grass that is now available. In 1903 the months of August and early September were so wet that it is doubtful whether the settlers succeeded in curing enough hay for their needs.

Character of soil.

Throughout the Spirit River country, and indeed nearly everywhere south of the Peace river, the subsoil is an impervious clay. The soil above this is generally four or five inches deep; sometimes a very little deeper and at Bremner's place at least, three years cropping has exhausted its fertility. Grain planted on this soil in 1903 was not worth cutting, while immediately beside it on new breaking there was a fine crop. The analysis of this subsoil made by Mr. Shutt would indicate that if worked into the soil by degrees it would prove productive, but so far it has been untouched, the settlers contenting themselves with cultivating the loamy surface soil.

Leaving the settlement at Spirit river, August 3rd, we travelled westward for about five miles across prairie; the trail then enters a forest of spruce and poplar. It is from this place that most of the house-logs used at Spirit river are procured. The prairie is less than a mile wide when the trail leaves it. The trail continues through the forest to Rat creek, but as one goes westward the spruce becomes

scarcer and at last almost disappears. For eight miles west of Rat creek to where we camped, the trail was for nearly the whole distance through *brulé*, on the remains of what was probably a spruce swamp, as the ground was everywhere wet. This was due in part to recent rains, but the plants showed that the ground is naturally damp. The soil was a shallow clay-loam with a clay subsoil. Travelling westward from our camp, the trail now used by Indians is north of that shown on the maps, the route having evidently been changed on account of burnt and fallen timber which blocked the road. With the exception of small patches of poplar woods the whole country has been burnt in recent years, some of it several times and as the amount of fallen timber will increase with every strong wind there will always be a considerable amount of chopping necessary in travelling by this trail. About 16 miles east of the British Columbia boundary the trail crosses to the south side of Bear creek, re-crossing to the north about six miles further on.

The soil over which the trail passed was thin and wet, though it will of course be drier when it is transformed into prairie. There were no bogs or muskegs, but the characteristic plants were all those that grow in cold undrained soil, *Nardosmia*, *Epilobium* and *Heracleum* being abundant everywhere. We camped at the last crossing of Bear creek. From this point to the junction of Bear creek and Pouce Coupé or l'Echafaud river, a distance of about ten miles, the trail for the greater part of the way kept close to Bear creek, the banks rising from about 25 feet at our camp to over 200 at the junction of the two streams. Near the edge of the valley and for a very short distance back, the country was dry, but as soon as the bank was left the ground became wet and marshy—not boggy—and the whole country from the trail north to the Peace river is probably of this description. It has all been burnt over. When cleared and drained, most of it will be suitable for such agriculture as the climate will allow of, but it is not attractive now. In the valley at the junction of Bear and Pouce Coupé creeks there are about 100 acres of open or bluffy land which would make a fine homestead.

County east of
Pouce Coupé
prairie.

Though the country was very wet between Spirit river and Pouce Coupé river, this was due in part to recent rains and even in wet seasons loaded pack animals can be taken over the trail. A wagon road could not be made without great expense, as there are wide stretches where the passage of a few loaded wagons would make the road unfit for further travel.

Three days were spent in thoroughly examining the Pouce Coupé prairie which lies almost altogether west of the British Columbia boundary. It is irregular in shape, stretching about three miles north of the junction of Bear and Pouce Coupé creeks. Though in the immediate vicinity of the creek—north of the junction—the country is wooded, southward along Pouce Coupé creek it is open prairie. To the west, the prairie extends about six miles and about five miles to the south of the junction. The country slopes up gently from all directions to a central plateau which is perhaps 200 feet above the top of the river bank and about 2,400 feet above the sea. Sloping towards the south from the plateau towards a branch of the creek, the country is more than half-wooded, i. e. covered with poplar and willow coppice or with full-grown trees. On the southwest of the creek referred to above there is also considerable prairie which slopes towards the creek. Of open prairie ready for the plough there is an area of about 25,000 acres and about the same of bluff country. The most open part almost wholly prairie, is directly west of the junction of Bear and Pouce Coupé creeks. This is cut by a creek in which is the only water in this part of the prairie. Towards the south and west there are several small creeks running in deep valleys.

Hay.

The largest marshes around which hay could be cut are at the north-west corner of the prairie, but there are a few very small marshes on the plateau, each an acre or two in extent, and one small lake. Hay could have been cut in 1903 almost anywhere on the prairie. The quality and quantity vary in different seasons. In a very dry season but little hay could be cut on the uplands.

A fine view of the country which surrounds the Pouce Coupé prairie could be obtained in every direction from the plateau. Patches of prairie show everywhere and a few more fires would transform the whole country into prairie, but on the other hand, a few years without fires would change much of the prairie into coppice.

Climate.

Half-breeds and old settlers living in the Peace river valley believe that the climate of the Pouce Coupé prairie region is much warmer in both winter and summer than at either Spirit river or Grande prairie and so far as can be judged from one season, there seems to be foundation for this belief. The saskatoon berries which were only beginning to ripen at Spirit river and north of Dunvegan, August 1st, were at Pouce Coupé prairie, a week later, perfectly ripe and the half-breeds and Indians who were drying berries told us that they had begun gathering the fruit a week before, so that in 1903 the season was a week or ten days earlier there than at the places referred to. This

may have been due to a drier July, but whatever the cause may be, it is probable that the climate is more temperate there. As this prairie is in British Columbia it will never be made available for settlement in any other way than by purchase.

Dr. G. M. Dawson crossed the Pouce Coupé prairie in 1879 and went eastward towards Spirit river. He describes the soil of that prairie in these words :*

Dr. Dawson's report.

'The plateau itself is usually a widely extended terrace level. The soil in the valleys is very deep and rich, while that of the plateau is similar but not so deep, and rests on a silty deposit, which when it comes to the surface gives the soil a pale aspect. Even the silt, however, is a rich soil as evidenced by the luxuriant growth found upon it.'

The trail followed eastward by Dr. Dawson was near that travelled by me going to the Pouce Coupé prairie. Of the country traversed he says :

'Turned eastward over the plateau with a general elevation of 2,380 feet, for a distance of fourteen miles. Small open meadows and prairies, aspen groves and thickets, willow coppice and tall well-grown woods of spruce and aspen alternate. Met with occasional swampy spots.' Travelling eastward for about fifteen miles, he says of the country :

'The country passed over resembles that previously described, the surface being nearly uniform, the highest point attained between the sources of small streams having a height of 2,670 feet. * * * From half to three-fourths of the region is well adapted to cultivation, with a rich soil.'

It should be remembered that Dr. Dawson's estimate here and in other parts of his report is based on the assumption that the silty subsoil is very fertile. For that assumption he had apparently no other warrant than the luxuriant vegetation that grew on this soil. The plants which compose the vegetation, however, indicate a wet, cold subsoil rather than a fertile one. The Spirit river country is only described by Dr. Dawson in general terms.

Leaving Pouce Coupé prairie, going south, the river was crossed and the stream followed which is shown on the maps as being nearest the British Columbia boundary. This is the main branch of Pouce Coupé or l'Echafaud river, heading southeast of Swan lake. After leaving the forks this stream runs through a wide flat, more than two-

*Report of Progress, Geol. Surv. Can., 1879, p. 49 B.

Country south
of Peace Coun-
ty prairie.

thirds of which is prairie. This is covered with fine grass, and a little work in clearing out logs when the grass is short in spring would make it easy to run a mower over it. About four miles up this stream it was crossed to the north side, and though there was no trail the route to Swan lake was not difficult. The country passed through and seen from the summits of the hills has been so frequently burnt over that there are few standing trees and the ground is encumbered with fallen logs. Before Swan lake is reached there are several large meadows, and around the west side of the lake there is a strip of open ground about 100 yards wide on which the grasses and vetches were shoulder high. Swan lake is said to teem with suckers, but no other kinds of fish are caught there.

Swan lake.

Around the south end of Swan lake and ordering the creeks which run through the flat there are perhaps a thousand acres of magnificent hay-land covered with grasses and carices breast high, *Calamagrostis Canadensis* (Blue joint) predominating. This was the finest meadow seen during the summer except that described on MacAllister creek. Swan lake would be an ideal place for wintering stock. It was my intention to ascend the creek to the height of land and then to descend Beaver Lodge creek to Grande prairie, but that route was found to be blocked by fallen timber, and about five miles east of Swan lake we turned north along a small creek and ascended to the plateau, along the edge of which a faint trail led towards the east. As we progressed this trail became better, and after eight or ten miles it could have been followed by anyone. These trails are so apt to become blocked at any time that a guide who knows the country on either side should be procured when this is possible.

The distance from Swan lake to Grande prairie in a straight line is about thirty-five miles—by the trail nearly fifty. The trail for the whole distance follows ridges when this is possible. These are separated by low ground, marshes or bogs, which must be crossed. The soil on the ridges is generally poor. Now and then a view could be obtained from the top of a ridge, and the character of the country to the north and south was the same as that passed through. It has nearly all been burnt over at different periods, and very little standing timber of any kind was noted. Very little good land was seen, and that always in small patches.

A little later, in going from Grande prairie to Spirit river, the circuit of the plateau which lies north of the Grande prairie was completed. The elevation of the plateau has been estimated to be 2,500 feet and its area about 800 square miles. Its elevation alone would

be sufficient to exclude it from any estimate that may be made of agricultural land, but, judging from what was seen, very little of it would be of value when cleared. On the northern and eastern slopes there is some spruce, perhaps sufficient for building purposes in that region, but it is in constant danger of destruction by fire.

THE GRANDE PRAIRIE.

No part of the Peace river country is more spoken of than the Grande prairie and a week was spent in carefully examining it from every point of view. A complete circuit of the prairie was made and it was crossed in two directions. It was found that since the line showing the approximate area of the Grande prairie was laid down by Dr. Dawson twenty-four years ago, the forest has in many places encroached upon the prairie so that it is not now of so great extent as was then reported. At a rough estimate, 200,000 acres may be given as the area of prairie land. It varies little in character, except that on a few ridges a little gravel appears; otherwise, the soil is a rich black loam on a clay subsoil. This loam, as I saw it, varies from four to six inches in depth. It may be deeper in places but if so, such soil has not been seen by anyone whom I met in the country and on the Grande prairie, as elsewhere, frequent holes were dug for the purpose of ascertaining the depth of the soil. Dr. Dawson's description of the general character of the country is as follows:—*

'The surface of Grande prairie is not monotonously undulating but may be characterized as forming a series of gently sloping ridges or swells between the various river and stream courses which are here not found to cut deep gorge-like valleys. Much of the country is park-like with groves of poplar, while extensive tracts are quite open, or with copse along the stream valleys only. Toward the edge, the prairie very often blends almost imperceptibly with the woodland by the gradual increase and coalescence of patches of poplar and willow.'

Character of country.

'The soil of Grande prairie is almost everywhere exceedingly fertile and is often, for miles together, of deep rich loam which it would be impossible to surpass in excellence. The low ridges sometimes show rather light soil with an admixture of sand or gravel and a few boulders, but a very small proportion of the surface is unfavourable to cultivation.'

While I cannot agree with Dr. Dawson in saying that the soil is "deep" or that it cannot be surpassed in excellence, it is true that

* Report of Progress, Geol. Surv. Can., 1879, pp. 53-54 B.

a very small proportion of the surface is unfavourable for cultivation. That it is not equally good will be seen from the description that follows, but if the climate proves satisfactory, there is practically none of the Grande prairie that is unsuited for agriculture.

Early frost. Coming from the west, we entered upon the prairie about ten miles northwest of Bear lake, where a long arm of open country runs like a bay into the forest. On the evening of August 13, when we were camped a little west of the head of Fish creek, the thermometer registered 29° at 10 p. m. and there would have been a severe frost if at that time the sky had not become overcast. At eleven o'clock the temperature had risen to 32°. Three days before at Swan lake, there were two degrees of frost and at that place also a cloudy night prevented heavy frost.

Before reaching the Grande prairie, we travelled for several miles along a branch of Bear creek through an open valley from three to five miles wide. As shown by the saskatoon berries, the season here was about two weeks later than at Pouce Coupé prairie and about one week later than at Saskatoon lake. This valley would be too cold for general farming, but a good deal of hay could be cut and no better place for cattle was seen during the summer. The Indian trail we had been following joined one of those from Spirit river to Saskatoon lake near Bear creek and after leaving that creek the prairie became drier and more rolling and in every way better suited for agriculture than the country to the northwest.

Cultivation. The only cultivation that has been attempted on the Grande prairie is in the vicinity of Saskatoon lake. At this place Mr. Alex. Monkman has about three acres broken on the west side of the lake and Mr. Louis Callihow about the same quantity on the north side. Callihow's barley was very fine and was turning yellow. Though it was planted during the last week in May, before the frost was out of the ground, it would be fit to cut about August 23, if the weather continued warm. His oats were also fine and potatoes fit to eat. Mr. Callihow said that in 1902, the season was very backward and his grain was not planted until June 10, but both barley and oats ripened. Mr. Monkman's field was planted principally in wheat and oats. The oats would probably mature, but the wheat, on August 16, was only in blossom and could hardly ripen. His grain and vegetables were not planted until the first week in June, as he had waited until the frost was out of the ground.

Frost in 1902. Mr. Monkman informed me that the first severe frost in 1902 was on August 24th, when potato vines were nipped and oats slightly

frozen. The oats were not spoiled for planting and were the seed used by Mr. Monkman in 1903. No wheat had ever been planted before 1903, so that there is not sufficient data upon which to base any conclusions as to the future of this part of the Grande prairie for wheat growing. It may be said, however, that though the farms at Saskatoon lake are beautifully situated, the conditions there are not such as would make the results at Mr. Monkman's place a fair test of what can be done on other parts of the Grande prairie. The soil is a rich loam lying upon the impervious clay subsoil already spoken of and there is no underdrainage. Within a few feet of Mr. Monkman's breaking, the clay sub-soil shone with moisture when the soil was lifted off, though there had been no heavy rain for two weeks.* In other parts of the Grande prairie, where there was better drainage, the condition of the natural vegetation proved that grain would ripen earlier than at Saskatoon lake.

Between Saskatoon lake and Beaver Lodge creek the trail skirts the western limit of the prairie and the country between the trail and the river is for the most part low prairie land or is swampy. There is very little dry prairie until within a mile of the Beaver Lodge where, on the north side, there is a fine open country sloping towards the river. In the valley, a few feet above the river, there was a small piece of ground under cultivation. The oats looked well, but the wheat was barely headed out, August 17th; the tips of the heads had been killed by frost and on nearly every head some of the grain envelopes were brown and dry. Potatoes were in flower and the ordinary garden vegetables looked well. This land had been broken and abandoned by a settler who went with several others to Grande prairie in the spring of 1903. I met him with his family near Spirit river two weeks later and asked him why he was leaving. His reply was "Can't you guess?" and nothing further could be got from him. He told me, however, that on June 25th, potatoes and beans had been frozen, though the young grain was not injured. Some twenty or twenty-five settlers went to Grande prairie during the winter and spring of 1903, but none of them remained. I met some half dozen or so of these during the summer and could get from none of them any satisfactory reason for not having remained. The country was not what they had thought it to be and they were going elsewhere.

Between Saskatoon lake and a small lake about ten miles to the southeast, there is a beautiful piece of rolling country with clay-loam

* It was from this place that the soil and subsoil reported upon by Mr. Shutt were taken but the character of the subsoil varies little, being generally fine silt or clay. See App. III.

Farming land
South-east of
Saskatoon
lake.

in the hollows and sandy loam with gravelly subsoil on the ridges. This is the best farming land seen on Grande prairie and it can be reached by going south from Saskatoon lake to the edge of the wooded country and then turning east. In the valley of a small creek flowing south towards the Wapiti river many beautiful homesteads could be located, with absolutely no drawback, if the climate proves favorable for the growth of cereals. At the small lake referred to above, there are at least 1,000 acres of hay marsh. Travelling northeast from this lake to Bear creek, the country crossed is generally level, covered with willow scrub, the soil a stiff clay with abundant evidence of alkali. At the crossing of Bear creek, the soil as shown by the banks of the creek, was from fifteen to eighteen inches deep, but after leaving the creek it became shallow again.

Kleskun lake.

Between Bear creek and Kleskun lake there is a long ridge upon which there are about 20,000 acres of prairie land. This ridge is quite without water, no creeks nor marshes being seen; but having a gentle slope, it is well drained, and the grasses and flowers were at least a week further advanced than at Saskatoon lake. The soil and subsoil were like those at Saskatoon lake, but being well drained and with a warmer aspect this area is far better suited for agriculture than where the settlement has been made. Kleskun lake is shallow and is gradually changing into a marsh; but in 1903 very little hay could be cut around its borders, as the water was very high.

All about the eastern and southern borders of the Grande prairie the forest has encroached on the prairie and the eastern end of Kleskun lake is now in the woods. Around this lake, as well as other lakes and ponds on Grande prairie, there is much lumpy, hard clay ground, over which it would be impossible to run a mower and which would be hard to break and cultivate. The larger of these lakes is bordered by alkali flats and if Kleskun lake were drained much of what is now marsh would become bare alkali ground. This lake received its name from the dangerous springy spots at the north-west end. At this place there are numerous spots, apparently small springs in the clay flat, many of them covered by a thin coating of dry clay, which is not strong enough to support a horse and in some cases it would not bear a man. Beneath the crust, there is mud of unknown depth and a horse getting in with all four feet is certain to be lost.

Hail.

I had been told that hail-storms were unknown in the Peace river country, but on Aug. 19th we had two thunderstorms accompanied by hail, either of which would have done damage to standing grain. One occurred at noon; the other about seven o'clock in the evening. The

hail was small, but the wind which accompanied the evening storm could be described as nothing less than a tornado. These storms were local and we saw no other hail during the summer. Burnt logs in various parts of the country were often seen spotted where hail had fallen upon them so that such storms cannot be infrequent. They may, however, do little or no damage. The country between Kleskun lake and Bear lake requires no special description, as it is of the same general character as that already described. Travelling over any part of the Grande prairie is so easy, either with pack-horses or wagons, that an intending settler would be very foolish to locate anywhere without first having seen the whole prairie.

In general terms it may be said that the Grande prairie is, as regards ^{Soil and climate.} soil, well suited for agriculture, though even in this respect it has always been spoken of in exaggerated terms. As regards the climate, there is unfortunately little data to go upon. No thermometer readings, of which we have any knowledge, were ever taken there before 1903, except those by Dr. Dawson in 1879. He was on the Grande prairie for a few days in August and on the 21st of that month noted six degrees of frost at Bear creek. This was quite cold enough to seriously injure grain, had any been growing there at that time. It has been cheerfully assumed by nearly everyone that the climate is good, but there seems to be absolutely no foundation for this belief, as agriculture was never attempted. Time and experience will alone show what the climate really is and whether it is suited to the growth of cereals. What is certain now is that the growing and ripening season is short and that in some seasons, at least, there are frosts that do serious damage. It will doubtless prove true that in some seasons, perhaps in most, grain will mature, but until this point has been determined it would be more than unwise for any one to settle on the Grande prairie with the intention of growing wheat as a main crop.

Between Grande prairie and Spirit river there is a wagon road which follows ridges and high ground. There is no good timber along this trail, though house-logs could be got out almost anywhere. The soil is only two or three inches deep above the usual silty subsoil. Where the trail first enters the open country it follows a narrow strip of prairie, which gradually widens. Up to within three miles of the settlement at Spirit river the ground is level, the soil thin, only two inches deep in some places, and *Deschampsia*, indicative of cold, damp soil, is the characteristic grass.

We left Spirit river August 27th for Lesser Slave lake. Going eastward to Burnt river, there is much open country, even after the

Burnt river.

prairie is left, and the soil is better than to either the south or west of the Spirit river prairie. Burnt river, at the crossing, is full of large boulders, which could be used for bridge piers or other construction purposes. After leaving Burnt river the trail follows narrow prairie openings, broken by thin strips of poplar, and my guide told me that the country was of this character south of the trail. These openings gradually became larger until we emerged on what I took to be Grizzly Bear prairie. Two openings (Grizzly Bear prairie and Fox prairie) had been described to me, but these names probably refer to the same piece of country. This is as good a tract of country as any we have passed through during the summer, if not the best. The prairie stretches from the trail to the Birch hills, and I estimated that there was about 10,000 acres devoid of trees or bushes. How much more there may be I had no way of estimating, but the whole country is there more or less open. Hay could be cut anywhere on the prairie and in small marshes and low spots. It is an ideal cattle country. The Birch hills have not been burnt on the north side, and there is much fine spruce among the poplar, especially towards the eastern and western ends. The prairie described is all west of the 6th Initial Meridian. Between the meridian and Egg lake the trail ran in some places through unburnt poplar woods, in others through open spots or willow coppice. The ground was everywhere quite dry at that time, but in spring the trail would be wet in some sections, though there is no boggy or soft ground.

Egg lake.

The country from Burnt river to Egg lake is quite level, no part of it rolling, and no bridges would be necessary for either wagon road or railway. Even in the thickest woods grass grows luxuriantly and covers the whole ground. "Blue joint" is the principal species in woods and thickets, and the soil is everywhere good. There were heavy thunderstorms on the 28th, and rain fell all day the 29th, clearing about five o'clock. At nine o'clock the thermometer registered 30°, and by eleven the wet tent was frozen stiff and there was ice on all water in pails and pans. The night was clear and bright, and this frost was doubtless general over a large area. During the night the thermometer fell to 26°. At seven A.M., with the sun shining brightly, the temperature in the shade was still below freezing.

The trail going towards Smoky river passes to the north of Egg lake. At this season the lake was almost wholly filled with grasses, sedges and rushes, only a few spots of open water being visible. It is completely surrounded by virgin poplar forest, with a few spruce trees interspersed. Between Egg lake and Smoky river the country

is dotted with low hills, between which are small marshes and ponds caused by old beaver dams. The Smoky was crossed at a strong Crossing of Smoky river. rapid about ten miles, by the river, below the Little Smoky. There is no difficulty in crossing, though the river is deep and swift, as gravel bars on both sides make a safe and easy landing for horses. We were fortunate enough to find an old canoe, but had we not done so there is an abundance of dry wood from which a raft could have been made.

From the crossing of the Smoky river to Stinking lake there is a fine winter trail, cut out for flat sleighs, but except for lightly loaded pack animals it is hardly passable in the summer, as it crosses a very wet country. For seven or eight miles from the river the country is wooded, but broken by innumerable small ponds and marshes. Then for about twenty miles there is a series of immense marshes with firm bottoms. Spots of dry ground a few feet above the water are dotted over these marshes, and on these there is standing poplar, most of it killed by fire or water. Several streams run through these marshes; one near the eastern edge of the marshy country and flowing to the southwest, which the trail follows for several miles, is bordered by dry ground, chiefly prairie, for a few hundred yards on each side of the stream. From the character of the marshes and old beaver dams, which the trail sometimes followed, I concluded that the marshes were caused by beaver dams, and on making inquiries at Lesser Slave lake from old hunters learned that such was really the case. There are now no beavers in the region, and if the channels of the streams were opened out and a few lateral drains dug most of these marshes would be transformed into hay land. At least 100,000 acres could be reclaimed at very little cost.

On the evening of September 2nd, dish-cloths and other damp things were frozen before dark, but a mist rising from the marsh the thermometer only fell to 28° ; the next evening to 27° and on the evening of the 4th, when a few miles west of Lesser Slave lake, to 24° . For Stinking lake, some distance before reaching Stinking lake, the trail passed brulé, second-growth poplar and black spruce swamp with a few marshes—the soil generally rather poor. Stinking lake is a fine body of water with an inappropriate name. From the east end of the lake to Lesser Slave lake, there is a good wagon road. On the night of the fourth, we camped near a potato-patch two miles west of Horse lake. The plants had been frozen twice before, the last time almost to the ground, and that evening a very severe frost finished them.

Very little time was spent at Lesser Slave lake, either when going into or coming out of the country, but much valuable data relating to

Agriculture at
Lesser Slave
lake.

agriculture was given me by the Anglican and Roman Catholic missionaries and others, while there. We arrived at the settlement, June 2nd, not having been able to get through the lake sooner as the ice did not break up until the 1st. At the Roman Catholic mission, at that time, pansies and perennial poppies were in full bloom and had been in flower for two weeks. Peas were six inches high, potatoes four, rhubarb was fit to use, onions from seed were above the ground and the first paragon had been cut ten days before. Pumpkins, started under glass, were a foot high and seeds planted out of doors had already sent up leaves. Everyone agreed that the season was about two weeks later than usual. At both the missions, the greatest possible care is taken in the cultivation of both vegetables and cereals and the mission gardens and farms are an object-lesson which others engaged in agriculture do not fail to study and profit by. As we passed the farm of the Roman Catholic mission several miles west of the lake on June 4th, barley, oats, and wheat were all above ground, but exactly three months later when I examined these fields, the wheat and oats were all frozen. Wheat was selected for examination from what seemed the ripest heads and none was found that was not too badly frozen to be of use for any purpose.

Condition of
crops.

When I reached the mission the next day the Rev. Father Demaris told me, however, that only part of the wheat had been frozen. Barley had either not been touched at all, or so slightly as to be barely noticeable. All the grain seen by me west of the mission farm had been badly frozen. The oat crop at the Anglican mission had ripened before the frosts came and was uninjured. The gardens at the Roman Catholic mission, at the Hudson's Bay Post and at Bredin and Cornwall's trading post on the east side of Buffalo lake—an extension of Lesser Slave lake—were almost untouched by frost. This was probably due, in part at least, to the frost having been accompanied by a light wind from the west which lost some of its coldness in crossing Buffalo lake and in part to the fact that the ridge behind these gardens keeps the sun's rays from the vegetation for an hour or so longer than on the west side of the lake where there is no such protection, thus allowing the frozen vegetation to recover by degrees. It is at any rate true that the gardens on one side escaped while in those on the other nearly everything but the hardiest vegetables was frozen, and I was told that this was not unusual.

There is a large and growing settlement around the west end of Lesser Slave lake and both as regards climate and soil this region is in the opinion of the writer as well adapted to agriculture and cattle-

raising as that nearer the Peace river.' On both sides of Lesser Slave lake the country is heavily wooded, much of the south side near the lake being swampy, but judging from its appearance from the lake and from the reports of those who have travelled on the north side of the lake there is much good land there, well-drained and sloping towards the lake. West of the lake, there is a considerable quantity of fine prairie land suitable for agriculture and a great deal of pasture and hay land, so that in the not distant future the acreage under cultivation will be very much larger than it is at present.

Travelling northwest, the country between Lesser Slave lake and the Heart river rises slightly and is clothed with aspen poplar. The soil is good, the forest easily cleared and the few damp spots now to be seen would disappear with the forest. A few spots have been cleared by fire and here prairie plants have established themselves. For ten or twelve miles before Cyprés creek is reached the country was not so good. There are many bogs and swamps and nearly everywhere spruce was mixed with the poplar denoting a damper soil. The country is nearly level, but there are a few low ridges on which Jack pine grows. Altogether, the soil is poorer and the proportion of arable land smaller than between Lesser Slave lake and Heart river and for a few miles beyond that stream. Along the trail, there is considerable prairie which begins about twenty-five miles from Peace river landing. This prairie is not very extensive, and all the open land has already been taken up by half-breeds. Oats have been planted in several places and the more hardy garden vegetables. Most of the settlers have a good many cattle about them, but not many horses. Before reaching the prairie, the country is similar to that beyond Cyprés creek, the soil fairly good but the need of drainage is everywhere apparent. We camped on the northern edge of the prairie, about eighteen miles from Peace River Landing and during the night of June 7-8 there was a severe frost, ice, half an inch thick forming on a pail of water covered by a tight lid. The natural vegetation was uninjured, however.

Country between Lesser Slave lake and Peace river.

THE LOWER PEACE RIVER.

Having learned that the small steamer owned by the Roman Catholic mission was to go down to Vermilion, passage was secured on this boat, and I left Peace River Landing on June 11th, reaching Vermilion on the 13th. For about fifteen miles below Peace River Landing the left side of the river valley has been denuded of forest by fire, but the banks are so steep that there is little land suitable for culti-

Peace river
to Vermilion.

vation. At eight or ten places in the 280 miles between Peace River Landing and Vermilion there are points where the country is prairie or partly open and level, and so is ready for immediate cultivation; in all, there would not be more than 5,000 acres, probably not nearly so much. There are, of course, wooded flats, which will be ultimately cleared and cultivated. No land is at present cultivated in the valley, except at Wolverine point, where half a dozen half-breeds have a few acres under cultivation. Except as noted above, the valley is heavily wooded until Prairie point is reached, 25 miles above Vermilion. There is much fine spruce on the islands in the river, but not much on the banks.

Country about
Vermilion.

Twelve days were spent in the vicinity of Vermilion, when every farm was visited and expeditions were made into the country, both to the north and south of the river. At Vermilion there is no very well defined valley, the land rising by gentle slopes and steps until the general level of the country is reached, perhaps 100 feet above the river. The soil varies somewhat in character, that on the lower levels near the river being a rich alluvium of great depth, while at higher levels it is sandy or clay loam, from one to two feet deep, generally on a gravelly subsoil. South of the river there is a strip of prairie about fifteen miles long and of varying width, and a great deal of bluff country broken by thickets of willow and young poplar. North of the river there is, near the settlement, much open prairie, and on the route to Hay river the trail runs for at least forty miles through prairie country, broken only by narrow patches of thicket and forest. Time did not permit of a thorough examination of this region, but its appearance from the trail indicated that this strip of prairie was everywhere narrow, seldom more than a mile in width; but I was told by those who knew the country that similar stretches of prairie ran parallel with the one I travelled over, and that on both sides of the Paddle river, for its whole length, there was much prairie. The country seems to be everywhere open, and the soil, wherever I examined it, of the same general character. Where the season is short and the drainage of vital importance, such soil as is found in the vicinity of Vermilion is of far greater value than that of the upper Peace River plateau, where water lies for a long time after heavy rains, causing growth to continue longer than is necessary or beneficial to growing grain. No estimate can be given here of the land about Vermilion that is ready for settlement, but there are at least 100,000 acres of prairie and bluff land, and the wooded portions can be very easily cleared.

Agriculture has been followed in a small way for many years, and two small grist mills supplied meal and flour for local needs. Two years ago, however, the Hudson's Bay Company erected a fine roller mill, with the intention of grinding flour for the northern trade, and encouraged by the certainty of a good market for all the wheat they produced, the settlers more than doubled their wheat acreage last year. This mill can produce from 250 to 300 pounds of flour per hour, and being lighted by electricity can be run day and night when necessary. The erection of such a mill in that latitude, where the transport of heavy machinery is so difficult and expensive, is the best evidence that can be offered of the belief of the residents in the future of the Vermilion district. Grist mill.

Frosts are felt at Vermilion as elsewhere, but they are there much more local in their character than on the upper plateau above Peace River Landing. Sometimes they are felt on one side of the river, sometimes on the other, but some grain escapes nearly every year. Until the last few years the cultivation of grain was confined to a very small area, and the average number of years that it ripened was three out of five. Now that farms have been scattered over a larger area, some near the river, some on the prairie remote from it, some grain will always escape, except in the rare years when frosts are general. Frosts. In 1903, the month of June was very dry and there was not much growth, but rains toward the end of the month supplied all the moisture necessary, and since my return I have received a letter from Vermilion which tells me that the crop was a fair one. My correspondent says :

"As you will remember, we had a very dry and late spring and that crops looked very backward in June. About June 22nd and for the following three weeks we had heavy showers with hot weather and this pushed the grain along very rapidly until the 20th of July when a light frost touched some of the earliest of the wheat, causing it to fail of developing a kernel, and also to give the straw a bluish appearance. After this frost we were favoured until fairly late in August with hot moist weather without a sign of frost. Wheat cutting commenced on the 17th August, while barley and oats were ripe on the 10th. Had the weather remained hot and dry for a week longer there would have been some very heavy crops, but during the latter part of August cold windy weather set in with little sunshine, so that the grain though ripe did not harden. The first fall frost occurred on the 5th of September. Crops in 1903

"Wheat will vary in quality from the best quality of No. 1 hard to pig feed, and in yield from 8 to 50 bushels to the acre. About 50 acres of my wheat will run about 40 bushels to the acre. There will be in the neighbourhood about 15,000 bushels of grain here, about half wheat.

"Potatoes are of very good quality and yield about 250 to 300 bushels to the acre. Garden stuff gave poor returns; the cold spring killed the seed to a large extent."

Farms at
Vermilion.

The largest farm at Vermilion is that owned by Mr. Sheridan Lawrence, about ten miles above the Hudson's Bay post, but on the north side of the river. At this place and at Prairie point, he has about 240 acres under cultivation, wheat and barley being the chief crops. Mr. Lawrence has about 100 cattle, 80 hogs, 30 horses and 150 hens. Other settlers, though not so rich in live stock, have ample for their needs. A small stream furnishes power for a grist mill, part of the year, and this mill and a saw-mill are run by a portable engine when water fails. Mr. Lawrence had in his granary more than a thousand bushels of grain, wheat mixed with "volunteer" barley, but most of it had been slightly frozen. His establishment includes a smoke-house for curing hams and bacon, which are sold at from 15 to 17 cents per pound. Mr. Lawrence's brother James was until this year in partnership with him. There are several farms of less extent on the north side of the river. At that owned by Mr. Lizotte, situated about seven miles from the river, I saw the finest wheat in the vicinity. The owner said that he was never troubled by frost, as there was generally a breeze at night from the little lake south of his house.

On the south side of the river the most extensive farm is cultivated by Mr. Fred. Lawrence, a cousin of the brothers referred to above. In addition to the homestead, he has broken forty or fifty acres on the prairie south of Vermilion and has rented the Anglican mission farm. His crop in 1903 was almost exclusively wheat. On the higher prairie land, the soil is lighter than nearer the river, but grain ripens sooner on the lighter soil; growth is not so luxuriant, the straw is shorter and the heads form sooner. On the heavy lands near the river, such long rank straw is produced the first year or two, that it is somewhat later in ripening, but this land will of course stand cropping for a greater number of years than the lighter soil of the higher levels.

Though not so large as some others, the finest farm at Vermilion is that of the Hudson's Bay Company. Careful cultivation is evident everywhere; the fields are free from weeds and "volunteer" grain, and nothing that will go to ensure a good crop is left undone. At the

Roman Catholic Mission, there is also a fine farm and garden; an irrigation ditch, running through the latter being an evidence that the rainfall is not excessive. About seven miles up the river, the two sons and four sons-in-law of James Smith have farms adjoining one another, all fronting on the river. Among the six, they have about 200 acres broken and nearly all planted in wheat. Altogether there are thirty men who have land under cultivation. With the exception of those mentioned the acreage is small.

The erection of the large grist mill affords a certain market for all the wheat grown and the market being certain the settlers have felt warranted in increasing their acreage by breaking up new land. As these settlers are nearly all "old timers," ex-Hudson's Bay Co's employees and half-breeds, their confidence in expending labour on the breaking of new land is the best of evidence that in some years at least the crops are good. I was told that in 1902 no wheat was frozen. The price paid at the mill is \$1.50 per bushel for clean wheat, but as the prices of everything but meat and flour are very high, the purchasing value of a bushel of wheat is really not greater than in Manitoba. All kinds of vegetables, including squashes and pumpkins mature every year and tomatoes generally ripen. Barley ripens every year and oats almost always.

Wheat growing at Vermilion.

Brick for the mill chimneys, etc., was made from clay dug a few yards from the mill; lime is brought from "the chutes" further down stream. \$15.00 per thousand is charged for lumber at the mills and shingles, dimension timber, etc., can be procured at very reasonable rates.

At both the Anglican and Roman Catholic missions, there are schools at which both native and white children are educated.

Though too remote from large markets at present, there is no doubt that the country about Vermilion is much better suited for general agriculture than the plateau above Peace River. Though more than two degrees further north, the difference in latitude is more than compensated for by the lower altitude. Vermilion is but 950 feet above the sea and the surrounding country little more than 1,000 ft., while the plateau north and south of Dunvegan is between 2,000 and 2,500 feet above the sea. The days at Vermilion are somewhat longer too during the summer, but the difference of more than 1,000 feet in altitude is quite sufficient to explain any difference in temperature.

Lower down the river, at the mouth of Little Red river, where there is a Hudson's Bay post, a garden has been cultivated for many years.

Only the hardier vegetables are grown now, but these all do well and the climate is at least as good as at Vermilion. Prof. John Macoun wrote of this place in 1875 : *

Red river.

' The vegetation indicated that Red river was even warmer than Vermilion and all garden vegetables were much more advanced. When St. Cyr, who had charge of the post, knew I was a botanist, he asked me to look at a strange plant he had in his garden. What was my astonishment to find a bed of cucumbers, with a number of ripe ones on the vines and many green ones also. I asked him if he raised the young plants in a hot-bed, but he knew nothing of such things. His beans, (both Windsor and pole), cabbage, turnips, potatoes and cucumbers are first class. Summer frosts never do any harm here and the soil is of first class quality.'

There are but a few hundred acres of prairie land at the mouth of the Red river, so that there cannot be very extensive farming until the country is cleared, but both soil and climate are good.

Prof. Macoun's report.

Of the country about Vermilion, Prof. Macoun wrote : †

' I first examined the field and garden and found with the utmost astonishment that, although more than two degrees further north than Dunvegan or St. John the barley and vegetables were much further advanced. Barley was standing in shocks in the field, having been out on the 6th of August, while scattered ears of wheat which I found around the fence were fully ripe Aug. 12th. The barley was sown on the 8th of May, having been in the ground just ninety days. The heads averaged from four to six inches in length and were full of large grains of a beautiful colour. In fact, both wheat and barley were the plumpest I ever saw. Turnips and Early Rose potatoes were quite large and both gave indications of a heavy crop. Mr. Shaw who had been postmaster at Vermilion for fifteen years told me that he had raised Indian corn both here and at Battle river without difficulty. * * * Often a whole season passes without a frost occurring from early in May until late in October.'

Of the country on the south and east sides of the Peace river between Peace River Landing and Red river, we have very scanty knowledge. The following extract from a report by Mr. R. G. McConnell describes a part of the region south of Vermilion : ‡

* Report of Progress Geol. Surv. Can. 1875-76, p. 161.

† Report of Progress Geol. Surv. Can., 1875-76 p. 159.

‡ Report of Progress Geol. Surv. Can., 1890-91, p. 14-15 D.

'From Fort Vermillion, a traverse of about forty miles was made inland to the Buffalo Head hills. For the first ten or twelve miles the trail led across a partially wooded and fertile prairie and then through marshes alternating with wooded ridges to Buffalo lake, a small sheet of water from two to three miles long and about a mile wide. Buffalo lake is bordered by extensive meadow lands, covered with luxuriant grass. After leaving it, we passed through an aspen wood, crossed two small streams flowing into Bear river and then for some miles travelled through a belt of partly wooded, partly open country which lies at the foot of the Buffalo Head hills. The greater part of the land just described is well fitted for settlement.'

Country east
of Vermilion.

From such information as could be gathered from Indians and half-breeds who have hunted in the country between Peace River Landing and Vermilion and between the Buffalo Head hills and the Peace river, the greater part of it is covered with forest or brûlé with many marshes and muskegs.

CONCLUSIONS.

After a perusal of all published reports on the Peace river country, an examination of almost every acre of cultivated land in that region and a careful study of the natural vegetation, soil and climatic conditions, I have been forced to the conclusion that, notwithstanding the luxuriant growth that is to be seen almost everywhere, the upper Peace river country, to which so many eyes are now turned, will never be a country in which wheat can be grown successfully. That this grain will mature occasionally there is no doubt, but that it will ever become the staple product of any considerable area I do not believe. The fact must never be lost sight of that there have been very few attempts to grow grain except in the river valley, and that when these attempts have been made they have almost always failed. Without any exception, every report on the productiveness of the soil and the suitability of the climate for the growth of cereals refers to the river valley, not one of those who have stated that the whole Peace river region was suited to the growth of wheat having any other grounds for that belief than the evidence afforded by crops grown in the valley. The character of the soil in different parts of the country has already been described, and nothing further need be said under this head, but when it is remembered that the plateau from which so much has been expected is from 800 to 1,000 feet above the river and from 2,000 to 2,500 feet above the sea, it will be seen that as a general proposition it is a great deal to assume that at

Peace River
district not
suited for
wheat grow-
ing.

Altitude too
great.

that altitude and in that latitude there would be no severe summer frosts, even were there no evidence against that hypothesis. There is, however, abundant evidence that in many years there *are* severe frosts in June, July and August, frosts which, if they do not entirely destroy the growing crops, render wheat unfit for flour-making purposes. Here and there through this report there are references to low temperatures in 1903 and other years, and among the two score or more old residents of that region with whom I talked in 1903 there was not one who believed that the parts of the plateau country with which he was acquainted were fitted for wheat-growing. Some of them thought some other part might be, but not the part with which they were acquainted. The general altitude of the whole upper plateau, which includes Grande prairie, is about the same as that of Edmonton, two degrees further south. Wheat is grown at Edmonton but not always with success, and there is no good reason for supposing that the conditions are any better at the same altitude near the Peace river. Much has been made of the supposed prevalence of warm western winds, but whatever effect these winds may have in the winter, they are not noticed in the summer, and strange to say, Dr. Dawson noted that summer frosts usually occurred in calm nights following a high wind from the *west*. He says, after referring to frosts on August 13th and August 20th:*

Summer frost. 'These frosts occurred in very fine weather, following a day of strong westerly winds, the result of which is to remove from the surface of the earth the whole of the lower heated layer of the atmosphere. This succeeded by a calm and cloudless night with transparent sky causes the thermometer to sink below the freezing point before morning. When not preceded by strong wind, mere transparency of the atmosphere seldom or never leads to frost in August in this district.'

My own observations showed that whenever the night was calm and the atmosphere transparent the thermometer fell to 35° or lower, but in 1903 cloudy nights were the rule. It has been supposed also that the days are very warm, but though no regular maximum temperatures were registered, the thermometer was frequently read when the temperature seemed very high, and it was never found on the plateau to reach 80°. A peculiarity noticed by both Dr. Dawson and myself was that the temperature fell very early in the afternoon, the average mean temperature for the 24 hours occurring about six o'clock, instead of at eight o'clock, as is the case in most places. Dr.

*Report of Progress, Geol. Surv. of Can., 1879-80, p. 73 B.

Dawson attributes this fact, and I think correctly, to 'the increased loss of heat by radiation due to the greater elevation and drier atmosphere,' and during the 'growing months' in 1903 there were very few nights, even when cloudy, that the thermometer did not fall below 50°. It will thus be seen that, though the hours of daylight are long in latitude 56°, the days are not very warm; the early and late hours of daylight are cool and the nights cold. Continued hot or 'muggy' weather, so common in the east, is absolutely unknown, and it follows that there is constant interruption in the growing time. June is a very uncertain month, sometimes being very wet, and again so dry that growing crops suffer from drought. July is, as it should be, dry, but unfortunately the month of August, upon which so much depends, is too frequently cold and wet. When that month is warm and there are no exceptionally heavy and long continued rains, a harvest may be hoped for if a severe frost is escaped, but in years like 1903, when the whole month, and especially the last two weeks, was characterized by wet, cold weather, it is impossible for wheat to ripen before the frosts, that must certainly come during the first week in September.

I was told that 1903 was an exceptional year, but others, who Climate. reported the same conditions in other years, were told the same thing and there are enough of these 'exceptional' years to warrant the belief that they may be expected at any time. Conclusions drawn from comparisons of mean temperatures, of hours of daylight, &c., are of no value when confronted with the undoubted fact that in one locality the thermometer falls to a point when wheat will be injured, while in another it does not. It has been said and will be said, that with settlement the climate will change. Perhaps it will to a certain extent, but more is to be hoped from hardier kinds of grain; grain that can adapt itself to severer conditions and which will ripen earlier. The Grande prairie and Spirit river regions will undoubtedly be better suited for grain culture when they have been drained, so that water will not lie on the clay subsoil; but the simple cultivation of the soil can do little to ameliorate the climate. If large tracts were ploughed and summer-fallowed, radiation from these would tend to keep the temperature a little higher, but on cultivated ground the vegetation is naturally taller and denser than where it is unbroken.

What has been said of wheat applies in a less degree to barley and oats. These grains, however, generally ripen earlier, especially barley, and it is probable that in most years barley would mature.

Cattle raising. While many think of the Peace river region as a wheat-growing country, others look at it only from the point of view of the stock-raiser, and it is very generally believed to be well-suited for ranching. It is true that for summer grazing, it would be hard to find better conditions. The vegetation is everywhere luxuriant and in addition to a great variety of nutritive grasses there are several species of leguminous plants which are unexcelled for fodder. These have been already mentioned, wild vetch and pea, with some nearly related species, being the most abundant.

Though running water is not always to be had, lakes and small marshes supply the necessary water for the summer and even in dry seasons cattle can always reach water. The problem of water supply for the winter will be a more difficult one to solve, but there is no reason to suppose that all the water needed cannot be procured from wells. Up to the present, there has been no attempt to dig wells, except in low spots where only surface water was sought.

Hay.

The question of hay for the winter is, however, the one that will determine the suitability of the Peace river country for cattle-raising and the length and severity of the winter are such that an abundant and unfailing supply of hay is a necessity. As has been already stated, there will be an ample supply of hay for the comparatively small number of cattle that settlers will require for their own use, but, in the opinion of the writer, any attempt to transform the whole region, or even a considerable part of it into a ranching country would meet with failure. Cattle must be fed at least four months, generally for a longer period, and to make hay for a large herd in such season as 1903 would be an absolute impossibility.

Horses.

Horses will doubtless do better than cattle, as they can procure food when cattle would starve. The snow-fall is not heavy in the Peace river region and the native horses run out all winter. Many of them die, however, and were it not that fresh horses are every year being brought in from the outside, the natural increase would not be sufficient for the needs of the country. Indeed as it is, it is almost impossible to buy horses anywhere. But while the Indian ponies manage to subsist during the winter without being fed, horses brought from the south must be fed for nearly as long as cattle and even then many of them die. When considerable numbers of horses and cattle have been acclimatized and their young have grown up under the conditions which prevail there, the period of winter feeding may doubtless be somewhat shortened.

It is as a matter of great surprise to find that, except at Vermilion, Hog raising, there was no attempt anywhere to cure pork. There is a large and increasing demand for bacon and pork and it certainly speaks poorly for the enterprise of the 'old timers' that they are content to pay high prices for Chicago or Edmonton pork when the conditions for raising hogs seem almost perfect. Several of the old settlers have a few pigs around them, but no bacon is made. At Vermilion hogs are allowed to run in the woods during the summer and are fed for a few weeks in the autumn on barley and shorts from the mill before they are killed. In a country where there will always be a certain amount of frozen grain, there will be an abundance of feed for hogs. Peas have seldom been grown except as garden vegetables, but field peas will generally ripen. The whole north has to be supplied with bacon and this demand with an evergrowing local market will ensure large returns for the capital invested when any one has enterprise enough to go into pork-curing as a business.

In regard to Vermilion as a region for settlement, it may be said that the lack of transport facilities confines the market for flour and pork to the north and there are already enough settlers there to raise all the wheat that can be ground in the local mills, if larger areas are tilled. The methods of some of these farmers are however, very slipshod and antiquated and experienced careful farmers from the south would soon force many of them to return to trapping and hunting, while others would have to go elsewhere. Over-production would be an almost immediate result of increased settlement, however, and there would of course be a fall in the price paid for wheat.

Very little has been said about the forests of the Peace river country Timber and from this fact it may be gathered that timber to be used for any other purposes than for house-logs and fence-rails is very scarce. There is quite enough spruce in the country to furnish lumber for housebuilding purposes, but it is scattered about among the poplar, often far from any stream that would float it to a mill and it will either have to be hauled to saw-mills or small portable mills must be moved about the country. To say that in the upper Peace River there is not more than 1,000,000 acres of prairie land is only another way of saying that what remains of that great area is covered with forest or has been so clothed within comparatively recent years. Unfortunately the country has been again and again swept by fire, until east of the mountains, there is now no considerable area of green timber left and what remains is chiefly poplar. Reference has been made in a few places to green spruce having been seen and these are the only places where it is to be

found in other than the scantiest quantities. Careful inquiry among those who know the country between Dunvegan and St. John and between Grande prairie and the Pine and Peace passes confirmed the reports that practically the whole of the forest has been destroyed by fire. East of the mountains there is no white pine, though it is frequently stated that there is. What is in ignorance taken for it is jack pine, but even of this there is very little.

While the country that has been described should, in the opinion of the writer, not be settled by either the raucher or the grower of wheat until there is more satisfactory evidence that it is suited for either of these pursuits, it may be safely prophesied that after railways have been built there will be only a very small part of it that will not afford homes for hardy northern people, who never having had much will be satisfied with little. It is emphatically a poor man's country, a country where any hard-working man may, in a few years, gather around him a few head of stock—horses, cattle and hogs—where he will be able to grow vegetables and in most years barley and oats and sometimes even wheat. But it will be many years before anything can be grown for export, even with good transport facilities. The building of the railway will lead to the development of the mines in northern British Columbia, and these mines will afford a market for beef and pork at least; but until there is some such market, cash will be very scarce. During the construction of the Grand Trunk Pacific Railway, there will of course, be a ready market for any produce grown near the route it will follow, but such a market cannot last more than a year or two and the demand for food products will cease when the road is completed.

ROUTES TO THE PEACE RIVER.

Routes.

The route usually travelled in going to the Peace river either in winter or summer is from Edmonton to Athabasca Landing, thence up the Athabasca and Little Slave rivers to Lesser Slave lake and from that place by wagon or sleigh to Peace River Landing. If pack-horses are used, the upper Peace River district may be reached by more direct routes, but on account of the difficulties to be met with in the form of rivers to cross, fallen timber to be cut through and almost impassible muskegs, the traveller who desires to reach the Peace river with the least trouble and expense is advised to follow the route outlined above and under no circumstances to attempt to use one of the cross-country trails unless accompanied by some one who is thoroughly familiar with the route chosen.

During the winter the sleigh road from Edmonton to Lesser Slave lake via the Athabasca river is well-travelled and from Lesser Slave lake to Dunvegan via Peace River Landing there is sufficient travel to keep the road in good condition. Along this route there are frequent stopping-places where food and shelter are to be obtained at very reasonable rates, so that there is no need for a traveller in winter to carry either food for himself or his horses. He may, however, do so if he wishes and facilities for cooking food are provided free of charge at most of the stopping-places.

Travellers during the summer months must carry with them their own camp outfit and a few necessary cooking utensils unless arrangements are made with boat-men and freighters to furnish meals, as except between Edmonton and Athabasca Landing and at the trading posts at Lesser Slave lake there are no regular stopping places. An intending settler taking his supplies in with him should if possible arrange in Edmonton with the Hudson's Bay Co., or one of the other trading companies who have boats on the Athabasca river, to have his outfit sent in ahead of him, as to arrive at Athabasca Landing, without having made such an arrangement will almost certainly result in vexatious delays at that place. There is no trouble in securing transport for freight either from Edmonton to Athabasca Landing or from Lesser Slave lake to Peace River Landing. The writer would, however, advise no one to go to the Peace River country with an outfit without first having visited the district and satisfied himself that the conditions come up to his expectations. The Peace river can be reached so easily and cheaply by a man travelling without heavy baggage or by a party of men so equipped that no one should decide to settle there without having first visited the country and decided upon the place where he will locate. In winter, transport can be secured from almost any freighter. In summer there is a stage twice a week from Edmonton to Athabasca Landing. The fare charged in 1903 was but \$7.00 ^{Fares.} which included ordinary luggage. On the York boats plying between Athabasca Landing and Lesser Slave lake the fare up stream was from \$7.00 to \$10.00, 150 pounds of baggage or camp outfit being carried free. Travellers must, however, cook their own meals or arrangements may be made to have them cooked for them, they providing the food. From Lesser Slave lake to Peace River Landing the charge for a team is usually \$20.00, but freighters are glad to carry passengers on their wagons for \$5.00.

After crossing the river at Peace River Landing there is a good wagon-road to Dunvegan and from Dunvegan to Grande prairie, and

horses and men may be hired at either place for the round trip. In 1903 the Roman Catholic Mission put a small steamer on the Peace river which carried passengers and freight up to St. John and down to Vermilion, the charges being very reasonable, but its trips are made at uncertain dates and no definite arrangements for transport on this boat could be made until the Peace river is reached. The round trip from Edmonton to Grande prairie can be made in a month or five weeks if reasonably good connections are made.

* Since this report was paged a letter has been received from Mr. Charles Bremner, who is referred to on page 14 as being the settler whose grain was most likely to ripen when I left Spirit river, August 27th. Mr. Bremner writes as follows:

According to promise I write you with regard to the condition of the crops here at time of harvest.

'The rainy weather which we were having when you left continued through September and October, giving the grain no opportunity to ripen. It was all frozen and useless for anything but green feed, with the exception of some of the barley, which, though frozen, will do for seed.

'Potatoes and other vegetables were all right, though they were all harvested between rains, so that there was some difficulty in drying them out. We hope for better luck next year.'

APPENDIX I.

Table showing minimum temperatures between June 12th and September 5th, 1903.

The records of Peace River Landing were made in the river valley, those at Dunvegan on the edge of the plateau about 700 feet above the river. All the other records were taken at about 2,300 feet above the sea, the average elevation of the country. In each case the date given is that of the morning following the night the minimum temperature was registered. The thermometer never registered above 40° when the night was clear. A constant check was kept on the thermometer by reading it whenever the temperature was low enough to freeze a damp cloth. This occurred in every instance when the thermometer registered 32°, so that all these readings are a fraction too high.

Place.	1903.	Minimum temperature.
Peace River Landing	June 12	31°
"	" 13	35°
"	" 14	28°
"	" 15	33°
"	" 16	37°
"	" 17	46°
"	" 18	44°
"	" 19	44°
"	" 20	33°
"	" 21	41°
"	" 22	44°
"	" 23	43°
"	" 24	34°
"	" 25	47°
"	" 26	37°
"	" 27	41°
"	" 28	40°
"	" 29	50°
"	" 30	37°
"	July 1	36°
"	" 2	46°
"	" 3	43°
"	" 4	44°
"	" 5	45°
Smoky River Mission	" 6	39°
"	" 7	41°
North of Smoky River Mission	" 8	36°
Old Wives lake	" 9	35°

PEACE RIVER REGION

Place.	1903.	Minimum temperature.
Bear lake	July 10.	27°
Between Bear lake and White-mud river.	" 11.	31°
White-mud river.	" 12.	40°
"	" 13.	38°
"	" 14.	45°
"	" 15.	45°
MacAllister creek.	" 16.	31°
Island creek	" 17.	34°
Little Burnt river.	" 18.	39°
"	" 19.	43°
"	" 20.	35°
Dunvegan	" 21.	39°
"	" 22.	40°
"	" 23.	7°
"	" 24.	44°
"	" 25.	50°
"	" 26.	38°
"	" 27.	44°
"	" 28.	48°
"	" 29.	47°
"	" 30.	46°
"	" 31.	51°
"	Aug. 1.	54°
Spirit river	" 2.	51°
"	" 3.	48°
West of Rat creek.	" 4.	45°
Bear creek	" 5.	35°
"	" 6.	35°
Pouce Coupé prairie.	" 7.	40°
"	" 8.	36°
"	" 9.	49°
South of Pouce Coupé prairie.	" 10.	45°
Swan lake.	" 11.	30°
Ten miles east of Swan lake.	" 12.	40°
Twenty-five miles east of Swan lake.	" 13.	39°
Near head of Bear creek.	" 14.	29°
Bear creek.	" 15.	39°
Saskatoon lake.	" 16.	38°
"	" 17.	48°
Near Beaver Lodge creek.	" 18.	35°
Bear creek.	" 19.	34°
Kleskun lake	" 20.	42°
Twenty miles north of Kleskun lake.	" 21.	46°
Spirit river.	" 22.	38°
"	" 23.	40°
"	" 24.	38°
"	" 25.	46°
"	" 26.	47°
"	" 27.	45°
East of Burnt river.	" 28.	44°
Egg lake.	" 29.	45°
"	" 30.	26°
"	" 31.	37°

Place.	1903.	Minimum temperature.
Smoky river.....	Sept. 1	35°
East of Smoky river.....	" 2	45°
" ".....	" 3	28°
Stinking lake.....	" 4	27°
Near Lesser Slave lake.....	" 5	24°

APPENDIX III

Preliminary Report, on Soil and Subsoil, collected near Saskatoon or Service-berry lake at the west end of the Grande prairie, Lat., 55° 15', Long, 119° 13' Peace River District, by Prof. Frank T. Shutt.

Surface Soil.— A heavy clay loam, but containing a small percentage of fine sand black or very dark brownish-black, from presence of humus (vegetable matter). As received, in the air-dried condition, it was in lumps and powder, the former, while not readily friable, could not be considered refractory. It had all the appearances of a fertile loam, and one that would prove suitable for the majority of farm crops, provided it were deep enough.*

It was found to have a very slightly acid reaction. Tested for alkali, only traces of common salt were found, though careful search for injurious sodium and magnesium compounds was made. A qualitative examination for lime, showed that the soil was by no means deficient in this element. A partial analysis of the air-dried sample furnished the following data:

	Per cent.
Moisture	3.44
Organic and volatile matter	11.82
Nitrogen	.471

We have in these results ample and emphatic evidence as to the richness of this soil in humus compounds and nitrogen, equalling in these respects much of the fertile prairie soil of Manitoba and the Northwest Territories. Time has not allowed any determination of the potash and phosphoric acid, but judging from past experience with soils of a similar humus and nitrogen content, this soil in all probability is well supplied with these constituents.

Subsoil :—This, as received, was in hard, exceedingly refractory lumps, of a greyish colour. Though in appearance and texture it was of an undesirable nature for mixing with the surface soil, analysis

* Mr. Macoun states that the surface soil is but 3 to 5 inches thick, resting without any gradual transition on the heavy subsoil of clay.

showed it to contain notable amounts of organic matter and nitrogen.
The data are as follows:—

	Per cent.
Moisture	3.42
Organic and volatile matter	8.01
Nitrogen	1.74

The general deductions that I am enabled to make from this preliminary examination are that the surface soil is by no means wanting in the elements of fertility, the chief drawback being reported shallowness. With good drainage, careful culture—particularly avoiding all working of the soil when wet—and favourable climatic conditions, it should prove a strong, productive soil, quite capable of yielding remunerative crops.

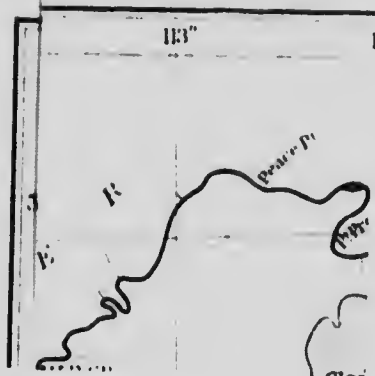
FRANK T. SHUTT,
Chemist, Dominion Experimental Farms.

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C.O. Senécal, B.A.Sc. Geographer & Chief Draughtsman,



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